

**VIBURNUM LEAF BEETLE, *PYRRHALTA VIBURNI* (PAYKULL)
(COLEOPTERA: CHRYSOMELIDAE): DISPERSAL PATTERN OF A
PALEARCTIC LANDSCAPE PEST IN NEW YORK AND ITS DISTRIBUTION
STATUS IN THE NORTHEASTERN U.S. AND EASTERN CANADA**

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Abstract.—*Pyrrhalta viburni*, a chrysomelid leaf beetle native to Eurasia, was first detected in central New York in 1996, and since has been spreading throughout the state. Distribution records are given and mapped for this *Viburnum*-feeding specialist in New York, Pennsylvania, Ohio, and Vermont. By summer of 2002, *P. viburni* had been recorded from 33 counties in New York, and its subsequent spread throughout a larger portion of the U.S. can be anticipated. In addition to feeding on several species of cultivated viburnums, the beetle also thrives on the native *Viburnum dentatum* var. *lucidum* (arrowwood), a widely occurring understory shrub in northeastern North America. The dispersal of *P. viburni* in New York has largely followed the distribution of its host plants, which leads us to predict that future spread will proceed most quickly through habitats contiguous with the current distribution of the pest and containing denser stands of *V. dentatum* var. *lucidum* or other native and cultivated viburnums that are suitable hosts for *P. viburni*. We also summarize the current distribution of *P. viburni* in neighboring states of the northeastern U.S. and in provinces of eastern Canada, based on personal communications with entomologists most acquainted with this ornamental and nursery pest.

Key Words: Coleoptera, Chrysomelidae, *Pyrrhalta viburni*, viburnum, invasive insects

Pyrrhalta viburni (Paykull), known commonly as the viburnum leaf beetle, is an urban landscape and nursery pest originally from Europe and Asia that is quickly spreading throughout the northeastern U.S. and eastern Canada. Although *P. viburni* was first detected in the Niagara Peninsula of Ontario (Fonthill) in 1947 (Sheppard 1955), established breeding populations were not documented until the late 1970's in the Ottawa-Hull regions of Ontario and Quebec, respectively (Becker 1979). In Canada, the beetle apparently spread slowly, reaching the Maritime Provinces by the early to mid 1990s (Wheeler and Hoebeke 1994) and in Maine by 1994 (Richard Dear-

born, personal communication). It was recently detected in British Columbia (Anonymous 2001, Gillespie 2001) where viburnums in the Barnaby and Vancouver regions have been heavily infested (Robert Costello, personal communication). We report here the spread of *P. viburni* within New York following its initial detection in 1996, through 2002, when it had been recorded in 33 counties and had begun to expand its range to states bordering on the east and south.

The only known hosts for *P. viburni* are deciduous shrubs and small trees in the genus *Viburnum*. Viburnums are among our most important landscape shrubs because of

their wide geographical adaptation, their versatility as functional landscape plants, and their visual qualities (Flint 1999). Approximately 150 species of *Viburnum* grow in the wild, most of them in temperate regions of Asia, Europe, and North America (Flint 1999). A number of native viburnums, such as *Viburnum dentatum* L. and its many varieties (arrowwood), *V. lentago* L. (nannyberry), *V. prunifolium* L. (northern black haw), *V. acerifolium* L. (maple-leaved viburnum), *V. rafinesquianum* Schultes (rafinesque or downy arrowwood), and *V. trilobum* Marsh. (American cranberrybush), and the introduced *V. opulus* L. (European cranberrybush) are favorite and highly susceptible hosts of *P. viburni* (Weston et al. 2000). Arrowwood (*V. dentatum*) is a variable species, growing wild over an immense range in eastern North America (Flint 1999); several natural varieties exist, differing in ultimate size and cold hardiness. In the northeastern U.S. and eastern Canada, *V. dentatum* L. var. *lucidum* Aiton (formerly known as *V. recognitum* Fernald, northern arrowwood) is the most northern of the "dentatum complex" populations, growing from New Brunswick, Canada, to Ohio and south to the mountains of northern Georgia (Flint 1999). It is this understory variety, occurring in low wet situations such as swampy woods and thickets (Soper and Heimburger 1982), that is so susceptible to attack and decimation by viburnum leaf beetle in the Northeast.

Adults and larvae of *P. viburni* can strip the leaves of viburnums in a relatively short period of time in outbreak situations. However, species of *Viburnum* differ greatly in their susceptibility to attack by *P. viburni*. Some species, notably arrowwood (*V. dentatum* var. *lucidum*) and the cranberrybush viburnums (*V. trilobum* and *V. opulus*), can be completely defoliated by the larvae and adults and killed after only a few years of repeated infestation, while others, especially leatherleaf (*V. × rhytidophylloides* J. Sur.) and Koreanspice viburnums (*V. carlesii* Hemsl.) and their relatives, are virtu-

ally immune (Weston et al. 2000, Weston and Desurmont 2002). Detailed information on the biology and seasonal history of *P. viburni* in North America is given by Becker (1979), while recognition features can be found in Wheeler and Hoebeke (1994).

One of us (ERH) has been conducting annual collecting survey trips to high-risk areas in the Northeast since the late 1970s with the intent to detect recently arrived exotic pests such as *P. viburni*. We are quite confident that the first breeding populations of the beetle were not present in New York much before 1996, if at all. We present here data regarding the spread of the beetle following its initial detection in New York State, offer an hypothesis to explain its dispersal in relation to native host plants, and make predictions concerning likely future range expansion.

DISPERSAL PATTERN

The initial detection of *P. viburni* in New York was in July of 1996 at Fair Haven Beach State Park, located in northern Cayuga County on the south shore of Lake Ontario (Fig. 1). Later that same summer, the beetle was found in Monroe, Niagara, Orleans, and St. Lawrence counties, and again at localities adjacent to the south shore of Lake Ontario and along the St. Lawrence Seaway (see distribution data below for details). Table 1 lists New York counties from which the beetle has been detected to date, and all collection sites are mapped in Fig. 1.

The most striking aspect of the invasion, or dispersal, sequence by *P. viburni* in New York is the bias for the beetle to be found in low-lying areas, especially near large bodies of fresh water. The initial detections in 1996 were sites in counties adjacent to the southern shore of Lake Ontario and the St. Lawrence Seaway. By 1998, the beetle was found in Wayne County, also bordering Lake Ontario. Also in the same year (1998), a number of the newly infested counties were confirmed, each bordering Lake Ontario, Lake Erie, or the St. Lawrence Sea-



Fig. 1. Map of New York showing current geographic range of *P. viburni* (open circles) as well as elevation contours. The northeast border of the state is almost entirely composed of major bodies of water including, from southwest to northeast, Lake Erie, Lake Ontario, and the St. Lawrence Seaway. Adjacent regions of Ohio, Pennsylvania, and Vermont are also included, with known collection sites for *P. viburni*. These images are from a CD-ROM collection of royalty-free maps by Map Resources Premier USA (<http://www.mapresources.com>).

Table 1. Detection of *Pyrrhalta viburni* in counties of New York following its initial detection in Cayuga County in 1996.

Year	County	Year	County
1996	Cayuga	1999 (cont'd)	Cortland
	Monroe		Essex
	Orleans		Madison
	Niagara		Oneida
	St. Lawrence		Onondaga
1998	Erie	Schuyler	
	Franklin	Steuben	
	Genesee	Tompkins	
	Jefferson	Wyoming	
	Livingston	Yates	
	Ontario	2000	Tioga
	Oswego		Herkimer
	Seneca	2002	Allegany
	Wayne		Broome
	1999	Chautauqua	
Clinton			Chemung
			Chenango

way, and a number of sightings were in counties bordering the previously infested counties, along larger inland bodies of water such as the Finger Lakes, or both (Fig. 1). This pattern of spread inland and along large bodies of water has continued during the period of 1999 to 2002: in 2000, the beetle was also discovered (by ERH) infesting native stands of *Viburnum* at Presque Isle State Park, Erie County, Pennsylvania (bordering Lake Erie and Chautauqua County, NY) and in Burlington, Chittenden County, Vermont (across Lake Champlain from Clinton and Essex Counties, NY). In late July 2002, ERH found a small population infesting native *V. dentatum* in Conneaut, Ohio (Ashtabula Co.), a lakefront community along the shore of Lake Erie in the very northern corner of the state adjacent to the Pennsylvania border. We believe this pattern is not merely coincidental, but instead can be largely attribut-

ed to the distribution of arrowwood (*V. dentatum* var. *lucidum*), a highly suitable, native host plant. This understory viburnum is found in a variety of habitats, but appears to prefer shaded, wetland areas along rivers and lakes. Comparing the distribution of freshwater wetlands with the recorded collections of *P. viburni*, one can see a fairly close correspondence between the two (Fig. 1). This leads us to predict that *P. viburni* will spread most quickly from its current distribution to adjacent areas that are favorable habitats for *V. dentatum* var. *lucidum*. In New York, this would include primarily the Mohawk River and Hudson River valleys. We would also expect the spread to continue fairly rapidly along the southern shore of Lake Erie into northern Ohio and Michigan. Ultimately, we might anticipate *P. viburni* to occupy most of the range of *V. dentatum* var. *lucidum* in the U.S. and Canada and perhaps beyond, but it is not clear if this landscape pest will be able to thrive in the hotter extremes of the range of *V. dentatum* var. *lucidum*. The distribution of this arrowwood variety will probably not be the major limiting factor in determining the eventual spread of *P. viburni* to more southern regions in the U.S.; the closely related *V. dentatum* L. var. *scabrellum* Torr. & Gray (rough arrowwood), distributed throughout the southeastern U.S. including Florida to Texas (cited as *V. dentatum* in Texas A&M Bioinformatics Working Group 1999), and *V. dentatum* var. *dentatum* Aiton (downy arrowwood), known from New Jersey to Florida and Texas, will, in all likelihood, serve as suitable hosts for *P. viburni*.

GEOGRAPHIC DISTRIBUTION

Here we provide distribution records of *P. viburni* from numerous New York localities (Fig. 1), based mainly on our collecting and observations, and those of a few others. At most sites, only adults were collected/beaten from viburnum foliage; however, at a few locations larvae also were observed and collected. Voucher specimens

of adults and larvae have been deposited in the Cornell University Insect Collection, Ithaca, NY. Unless otherwise stated, most collections were made by the junior author (ERH); all collections made from *V. dentatum* actually refer to the var. *lucidum* (formerly known as *recognitum*).

NEW YORK: *Allegany Co.*, Alfred, Alfred State College, 30 May 2002, ex *V. dentatum*. *Broome Co.*, Binghamton, Binghamton University, 13 June 2002, ex *V. dentatum* and *V. trilobum*; Vestal, Vestal Parkway West (Rt. 434), 13 June 2002, ex *V. dentatum*; Whitney Point, 13 June 2002, ex *V. trilobum*. *Cattaraugus Co.*, Olean, St. Bonaventure University, 30 May 2002, ex *V. dentatum*. *Cayuga Co.*, Fair Haven, Fair Haven Beach St. Pk., 5 July 1996, 24 July 1996, ex *V. dentatum*; Auburn, 2 June 2000, ex *V. trilobum*. *Chautauqua Co.*, southwest of Van Buren Point, Lake Erie St. Pk., 5 August 1999, ex *V. dentatum*, P. Weston and ERH; Fredonia, SUNY Fredonia, 5 August 1999, ex *V. dentatum*, P. Weston and ERH. *Chemung Co.*, Newtown Battlefield, Rt. 17, 13 June 2002, ex *V. dentatum*. *Chenango Co.*, Bainbridge, General Clinton Park, 13 June 2002, ex *V. dentatum*. *Clinton Co.*, Plattsburgh, 27 May 1999, Amy D. Ivy, ex *V. opulus*. *Cortland Co.*, Cortland, SUNY Cortland, 29 July 1999, ex *V. trilobum*. *Erie Co.*, East Aurora, 21 August 1998, ex *V. dentatum*; Grand Island, 21 August 1998, ex *V. trilobum*; Wales Center, 21 August 1998, ex *V. trilobum*. *Franklin Co.*, 1 mi. W. of Malone (First Natl. Bank), 20 August 1998, ex *V. trilobum*; Paul Smiths, 10 June 1999, Amy D. Ivy, Franklin/Essex Cos., Saranac Lake, 10 June 1999, Amy D. Ivy. *Genesee Co.*, Alexander, 10 May 1998, ex *V. trilobum*; Pembroke Travel Plaza (Corfu), Rt. 90, 21 August 1998, ex *V. dentatum*. *Herkimer Co.*, Indian Castle Travel Plaza (Little Falls), Rt. 90, 21 July 2000, ex *V. trilobum*. *Jefferson Co.*, Selkirk Shores St. Pk., 18 August 1998, ex *V. dentatum*; Southwick Beach St. Pk., 18 August 1998, ex *V. dentatum*; Westcott Beach St. Pk., 18 August

- 1998, ex *V. dentatum*; Burnham Point St. Pk., 18 August 1998, ex *V. trilobum*; Wattertown, Rt. 11 nr. hospital, 20 August 1998, ex *V. dentatum*, Livingston Co., Geneseo, SUNY Geneseo campus, 21 August 1998, ex *V. trilobum*, Madison Co., Cazenovia, nr. lake park, 29 July 1999, ex *V. trilobum*; Hamilton, Colgate University campus, 29 July 1999, ex *V. trilobum*, Monroe Co., Hamlin, 6 July 1996, 12 July 1996, ex *V. dentatum*; east of Hamlin Beach St. Pk., along parkway, 12 July 1996, 28 August 1996, ex *V. dentatum*; Hamlin Beach St. Pk., 12 July 1996, ex *V. dentatum*; Lakeside Beach St. Pk., 12 July 1996, 28 August 1996, ex *V. dentatum*; Braddock Bay Park, 28 August 1996, ex *V. dentatum*; Scottsville, Scottsville Travel Plaza (Scottsville), Rt. 90, 21 August 1998, ex *V. trilobum*; Spencerport, 7 August 1999, ex *V. trilobum*; Webster, 14 July 1997, Ciney Kindie, ex *V. dentatum*, Niagara Co., nr. Olcott, 28 August 1996, ex *V. dentatum*; Niagara Falls, 7 June 1997, 16 May 1998, ex *V. trilobum*, Oneida Co., Clinton, Hamilton College campus, 29 July 1999, ex *V. trilobum*; Oneida Travel Plaza (Westmoreland), Rt. 90, 21 July 2000, ex *V. trilobum*, Onondaga Co., Syracuse, Syracuse Univ. campus (Walnut Place at Waverly St.), 3 June 1999, ex *V. trilobum*; Marcellus, 4 June 2000, ex *V. trilobum*; Tully, 4 June 2000, ex *V. dentatum* and *V. trilobum*; Fayetteville, 17 June 2000, Howard Deutch, ex *V. trilobum*, Ontario Co., Clifton Springs Travel Plaza (Clifton Springs), Rt. 90, 21 August 1998, ex *V. dentatum*; West Bloomfield, 21 August 1998, ex *V. trilobum*; Canandaigua, Finger Lakes Community College campus, 21 August 1998, ex *V. dentatum*; Geneva, Hobart & Smith College, 30 May 1998, 18 August 1998, ex *V. dentatum*; Gorham, 29 May 1998, Brian Eshenaur, ex *V. dentatum*; Honeoye, 29 May 2000, ex *V. trilobum*, Orleans Co., Albion, 1 September 1996; Golden Hill St. Pk., 12 July 1996, 28 August 1996, Oswego Co., Oswego, SUNY Oswego campus, 30 May 1998, 18 August 1998, ex *V. trilobum* and *V. dentatum*; Oswego, Port of Oswego Authority, 18 August 1998, 6 June 2001, ex *V. trilobum*, Schuyler Co., Watkins Glen, Watkins Glen St. Pk., 26 August 1999, ex *V. trilobum*, Seneca Co., East Varick, Rt. 89 (Lakeshore Landscaping), 12 October 2000, ex *V. dentatum*; Geneva, Seneca Lake St. Pk., 21 August 1998, ex *V. trilobum* and *V. dentatum*; East of Seneca Falls, Cayuga Lake St. Pk., 21 August 1998, 25 August 1999, 6 June 2001, ex *V. trilobum*; Seneca Falls (Outlet Factory Mall), 29 May 2000, ex *V. trilobum*, St. Lawrence Co., Ogdensburg, public library, 11 August 1996, 31 May 1997, 19 August 1998; Canton, SUNY Canton, 11 August 1996, 31 May 1997, ex *V. dentatum*; Canton, St. Lawrence University campus, 20 August 1998, ex *V. dilatatum?*; Pottsdam, Clarkson Univ. campus, 11 August 1996, 20 August 1998, ex *V. dentatum*; Gouverneur, 12 August 1996, 31 May 1997, 20 August 1998, 3 June 2000, ex *V. dentatum* and *V. trilobum*; Massena, Robert Moses St. Pk., 20 August 1998, ex *V. trilobum*; Wanekena, SUNY Forestry School, 2 June 2000, ex *V. dentatum*, Steuben Co., Lawrenceville, 20 August 1998, ex *V. trilobum*; nr. Dansville, Stony Brook St. Pk., 5 August 1999, P. Weston and ERH, ex *V. trilobum*, Tioga Co., Owego, Tioga County Fairgrounds, 24 May 2000, ex *V. dentatum*, Tompkins Co., Ithaca, Buttermilk Falls St. Pk., 3 September 1999, ex *V. trilobum*; Trumansburg, nr. laudromat, 31 July 1999, 21 August 1999, 3 June 2001, ex *V. trilobum* and *V. dentatum*; Ithaca, Cornell University campus, 10 August 1999, ex *V. trilobum*; Varna, 31 May 2000, ex *V. trilobum*, Wayne Co., Clyde, 11 October 2000, ex *V. dentatum*; Wolcott, 30 May 1998, 18 August 1998, ex *V. trilobum*; East Bay Park, 29 May 1998, Dawn D. O'Brien, ex *V. dentatum*, Wyoming Co., Portageville, south end of Letchworth St. Pk., 5 August 1999, P. Weston and ERH, ex *V. trilobum*, Yates Co., Bellona Sta., 8 June 1999, ex *V. trilobum*, Gary Chicoine.

STATUS OF *P. VIBURNI* IN OTHER EASTERN
U.S. STATES AND EASTERN
PROVINCES OF CANADA

Collections made by ERH during the period of 2000–2002 also confirmed the spread of *P. viburni* into Pennsylvania, Ohio, and Vermont, where viburnum leaf beetle was not known to occur previously. The new locality data for Ohio, Pennsylvania and Vermont are as follows: OHIO: Ashtabula Co., Conneaut, 19 July 2002, ex *V. dentatum*. PENNSYLVANIA: Bradford Co., Sayre, Gene Paluzzi Memorial Riverfront Park, 13 June 2002, ex *V. dentatum*. Erie Co., Erie, Presque Isle St. Pk., 24 August 2000, ex *V. dentatum*. McKean Co., Bradford, University of Pittsburgh-Bradford, 30 May 2002, ex *V. dentatum*; Smethport, McKean County Courthouse, 30 May 2002, ex *V. dentatum*. Potter Co., Denton Hill State Park, ski area, Rt. 6, 30 May 2002, ex *V. dentatum*. VERMONT: Chittenden Co., Burlington, Univ. of Vermont campus, 24 July 2000, ex *V. trilobum*; Burlington, Leddy Park, 24 July 2000, ex *V. trilobum*.

In the United States, *P. viburni* was first discovered in Maine as early as 1994; it was reported in a June 8, 1994 update on "Forest & Shade Tree Insect & Disease Conditions for Maine" that *P. viburni* was observed in the Portland area (Cumberland Co.), especially on maple-leaved viburnum (*V. acerifolium* L.). In this update on insect and disease conditions, populations of the beetle were reported to be "locally heavy," that "many shrubs had already been stripped," and that this was "at least the second year of such activity according to local reports." By July 24, 1994, viburnum leaf beetle was also reported from the Waterville area (Kennebec Co.). Presently, *P. viburni* is widely distributed in Maine, but is most abundant in areas south of a line drawn roughly through Rangeley (Franklin Co.), Greenville (Piscataquis Co.) and Millenocket (Penobscot Co.). It is also known as far north as Presque Isle on the east side

of the state in Aroostock County (Richard Dearborn, personal communication). To date, *P. viburni* has not been reported from New Hampshire, although there is an unconfirmed sighting of damage several years ago (about 1997) on the eastern border with Maine at Eaton (= town name for Eaton Center) or Freedom (Carroll Co.) (Alan Eaton, personal communication). In spite of efforts by entomologists to locate *P. viburni* in Massachusetts, it is still unreported from that state (Craig Hollingsworth, personal communication). Since its discovery in Burlington, Vermont in the summer of 2000 (by ERH), *P. viburni* is now well established and causing significant damage to viburnums (*V. trilobum* and *V. dentatum* in particular), especially in the lake-bound areas of Grand Isle Co. (North Hero and other localities) and in at least six northern and central counties of Vermont (Margaret Skinner, personal communication); southern counties of the state have not been well surveyed for *P. viburni* and therefore, there are no records to date (Scott Pfister, Trish Hanson, personal communication). However, there is an unconfirmed sighting of foliage damage by *P. viburni* in Rutland County, across from Whitehall, New York (Washington Co.) (Scott Pfister, personal communication).

Pyrrhalta viburni has been expanding its range in the eastern Canadian provinces as well. Throughout most of southern Ontario, including the major population centers of Hamilton, Burlington, and Toronto, *P. viburni* has been considered a significant landscape pest of ornamental viburnums as well as of the native understory species (Steve Marshall, Christine Blaser, personal communication). Likewise, *P. viburni* is apparently widespread in southern Quebec, including the Montreal area (Terry Wheeler, personal communication). Based on several annual collecting surveys trips to the Canadian Maritime provinces made during the period 1993–2001 by ERH, *P. viburni* was found to be relatively common throughout the coastal area of New Brunswick between

Saint John and St. Stephen, as well as in Fredericton, and also in Halifax, Nova Scotia (Wheeler and Hoebeke 1994), and Charlottetown, Prince Edward Island (E. R. Hoebeke, unpublished data).

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Note added in proof.—Since preparing the original manuscript, *P. viburni* has been detected in two new counties in New York State (Albany and Rensselaer counties), apparently the result of transportation of infested nursery stock (Chuck Schmidt, Cornell Cooperative Extension, Albany, NY).